CLAIMS

1. A particle, having at least one changed morphological, chemical or physical feature, wherein said changed feature can facilitate the attachment of at least one agent to the outer surface of the particle, thus permitting the particle to act as a carrier for said at least one agent.

2. A particle according to claim 1, wherein the changed feature is either hairs, pores, increased hollow volume, surface dimpling, spongy-like formation, modified particle surface roughness, particle shape, particle size, density, modified specific surface area, reducing cohesiveness, improved powder flow, improvement in aerodynamic properties of the particle, transfer and attachment of at least one agent to the particle, the result of transfer of at least one agent and combinations thereof.

3. A particle according to any of the preceding claims, wherein the particle is spherical in shape.

4. A particle according to claim any of the preceding claims, wherein the particle is between 0.05μm and 4000μm in diameter.

5. A particle according to any of the preceding claims, wherein the agent is selected from the group: therapeutic agents, prophylactic agents, diagnostic agents, excipients, diluents, flavourants, fragrances, dyes, nutrients and sweeteners.

6. A particle according to claim 5, wherein the agent is a therapeutic agent selected from a list consisting of: corticosteroids, anti-inflammatories, anti-tussives, bronchodilators, diuretics, anticholinergics, hormones, analgesics, vaginal preparations, antiallergics, anti-infectives, antihistamines, anti-neoplastic agents, anti-tuberculous agents, proteins, polymeric drugs, lipids, organic substances, inorganic substances, nutrients, pro-drugs, antigens peptides and derivatives thereof.

7. A particle according to any of the preceding claims, wherein the particle can be administered by a route selected from a list consisting of: pulmonary, oral, parental, nasal, rectal, tonsillar, buccal, intra-ocular, topical/transdermal, or vaginal.

8. A particle according to any of claims 1 to 7, wherein the agent is either beclomethasone, fluticasone, lactose, polyvinyl pyrrolidone or polyvinyl alcohol.

9. A particle according to any of claims 1 to 8, wherein the particle itself acts as an agent.

10. A method of treating particles to engineer/architecture them with particular chemical, morphological and physical features, or combinations thereof, comprising the steps of:

a) Optionally processing, at least one agent to form a particle;
b) treating the particle by making available a fluid, alone or in combination with at least one additive(s) or further agent(s), to the particle to promote change in one or more of the morphological, chemical or physical features of the particle;
c) repeating step (b) as many times as necessary;
d) harvesting engineered particles; and
e) repeating steps (a) to (d) as many times as necessary.

11. A method according to claim 10, wherein the promoted change of step (b) results in at least one change to the particle from a list consisting of: forming and or promoting and or controlling the growth of hairs; modifying the properties of the existing hairs; promoting the formation of pores; modifying the properties of existing pores; increasing the hollow volume of the particle; modifying the density, modifying and controlling the particle size, controlling particle size growth, increasing or decreasing the surface area or specific surface area of the particle; reducing the cohesiveness of the particles; increasing the flow of the powder; forming and/or modifying surface dimpling; formation and/or modification of sponge-like formations; alteration of particle surface roughness, improvement in the aerodynamic properties of the particle, ability of the particles to form a stable uniform mix, ability of the particles to improve blend uniformity and content uniformity.

12. A method according to claim 10 or 11, wherein at least one further agent(s), further fluid(s), further additive(s) or combination thereof, is added to any stages a) to e) of claim 10.

13. A method according to claims 10, 11 or 12, wherein the agent is selected from a list consisting of: corticosteroids, anti-inflammatories, anti-tussives, bronchodilators, diuretics, anticholinergics, hormones, analgesics, vaginal preparations, antiallergics, anti-infectives, antihistamines, anti-neoplastic agents, anti-tuberculous agents, proteins, polymeric drugs, lipids, organic substances, inorganic substances, nutrients, pro-drugs, antigens peptides and derivatives and combinations thereof.

14. A method according to claim 13, wherein the agent(s) of the particle is either a combination of polyvinyl alcohol and lactose, a combination of polyvinylpyrolidone and lactose or lactose.

15. A method according to any of claims 10 to 15, wherein the additive is selected from a list consisting of: heat, moisture, radiation, pressure, shear forces, magnetic forces, vibration, stirring, vortexing, vacuum, mixing, tumbling, centrifuging, masticating, ultra-sound waves or extruding, electrical, disaggregation agents, or combinations thereof.

16. A method according to claim 15, wherein at least one selected additive is stirring.

17. A method according to claim 15 or 16, wherein at least one selected additive is the maintenance of the heat range -200 to 200°C.

18. A method according to any of claims 10 to 17, wherein the engineering step lasts for between 1 microsecond and several hours.

19. A method according to any of claims 10 to 18, wherein the agent of the particle or agent added to the particle during the engineering process of claim 10 is a polymer.

20. A method according to claim 19, wherein the polymer is selected from a group consisting of polyvinyl alcohol, polyvinylpyrolidone and polyethylene glycols.

21. A method according to any of claims 10 to 20, wherein the fluid contains at least one medium, and/or at least one agent, and/or at least one additive and combinations thereof, that promotes changes in any of the morphological, chemical or physical features of the particle.

22. A method according to claim 21, wherein the fluid is in the bulk liquid state, dispersed liquid state (for example as droplets, mist, fog, spray), vapour state or combinations thereof and is either aqueous, organic, liquefied gases or a combination thereof.

23. A method according to claim 22, wherein the liquid state includes the following: droplets, mist, fog and spray.

24. A method according to any of claims 10 to 23, wherein the fluid comprises either water, hydrocarbon liquids, halogenated hydrocarbons, mineral spirit, mineral oils, mineral acids, oxygenated solvents, alcohols, nitrogen containing hydrocarbons, sulphur containing

hydrocarbons, hetero-atom containing hydrocarbons, anaesthetics, liquefied gases such as liquid nitrogen, the vapour from liquid nitrogen or combinations thereof and refrigerants.

25. A method according to claim 24, wherein the fluid is either water, acetone, ethanol, or combinations thereof.

26. A method according to any of claims 10 to 25, wherein engineering the particle with fluid comprises introducing the fluid, which may be static or in motion, to the particle either in bulk, as droplets, as a foam, as a mist, as fog or as a spray.

27. A method according to any of claims 10 to 25, wherein engineering the particle with fluid comprises introducing the particle, which may be in static or in motion, to the fluid either in bulk, as dispersed particles, as droplets, as a foam, as a mist, as fog or as a spray.

28. A method according to any of claims 12 to 27, wherein the further agent added is polyvinylpyrrolidone, lactose or therapeutic agents such as beclomethasone dipropionate or fluticasone propionate.

29. A low density drug carrier particle having hairs on the surface thereof, wherein the particle acts as a carrier for the delivery of either anti-inflammatory drugs, bronchodilator drugs or a combinations thereof into the lungs of a patient via dry powder inhalation.

30. A carrier particle according to claim 29, wherein the drugs being delivered are either beclomethasone dipropionate, fluticasone propionate, salbutamol sulphate or a combination thereof.

31. The use of particles according any of claims 1-9 and 29-30 as whole particles with hairs, particle fragments of any size with hairs, whole particle with some or all the hairs detached from the particle and particle fragments of any size with some or all the hairs detached from the fragment.

32. The use of hairs detached from particles of claims 1-9 and 29-30 as agent delivery particles.

33. The use of particles with hairs according to claim 32 that that can allow more agent particles to be attached to one such hairy particle and can reduce the ratio of the hairy carrier to agent particle ratio and combinations thereof.